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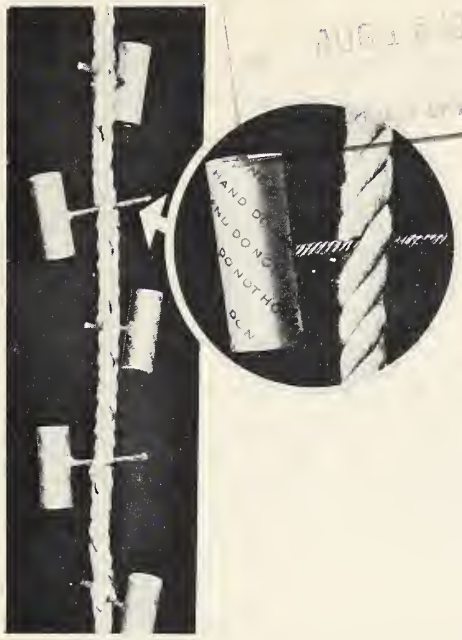

THE ROPE FIRECRACKER

A DEVICE TO PROTECT CROPS FROM BIRD DAMAGE

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Warning

Firecrackers as described in this leaflet can seriously maim or kill. Handle them cautiously and with the respect that is due explosives, which they are.

Damage by birds to grain, fruit, and vegetable crops is a widespread problem which at times requires aggressive action to prevent serious financial losses. Reduction of the population of the species causing damage is an obvious approach in seeking relief from damage, but effective killing methods are costly and often hazardous to humans, domestic animals, and desirable wildlife. Furthermore, large-scale programs of bird destruction are not always in the best interests of the farmer, since the offending species may be beneficial in its habits part of the year. Fortunately, in many situations bird-deterrent measures provide effective and economical protection of crops and, because they are usually safer, they are more practical.

Farmers have had to contend with bird-damage problems for generations. The experience as youngsters of spending day after day in the fields "minding birds" by beating on pans or banging boards together, is undoubtedly familiar to many readers of this leaflet. With a change-over from diversified to specialized farming, larger acreages are being devoted to single crops, and because of this the modern farmer may be aggravating this old problem by concentrating those bird species that are favored by this practice.

Rural areas, especially in the East, are being developed by expanding suburban and city populations. Many species of birds that frequent man's dwelling sites are helped by this growth and shifting of human population. Some of these are the cause of bird damage in berry patches, orchards, and vineyards which used to be more remote from human habitations. Because of the hazard to people and their property, the use of firearms as scare devices to prevent damage is becoming more restricted.

UNITED STATES DEPARTMENT OF THE INTERIOR Douglas McKay, *Secretary*

FISH AND WILDLIFE SERVICE John L. Farley, *Director*

Washington • April 1955 • Wildlife Leaflet 365

The consumer is demanding higher quality produce, which in turn requires greater effort on the farmer's part to produce high quality crops. This involves the use of more hours of labor in the face of high labor costs. Therefore, the most acceptable scare devices are those which operate automatically with a minimum of labor.

The rope firecracker is such a device. It consists of a series of firecrackers attached by their fuses at intervals along a slow-burning cotton rope.

Since 1949 the U. S. Fish and Wildlife Service has experimentally used this device successfully in reducing damage caused by red-wings, cowbirds, and grackles in Arkansas rice fields. In Delaware, New Jersey, and Florida it has been employed to prevent blackbird depredation on field and sweet corn. It has also been tried with good results in Colorado to protect cornfields invaded by wild ducks and at fish hatcheries subject to predation by fish-eating birds.

A very desirable feature of rope firecrackers is their adaptability to the individual farmer's needs. Rope firecrackers may be required in some fields for only a short period after dawn and again in late afternoon, in others they may be needed all day long. A knowledge of the local situation is necessary for determining the periods of operation, the number and length of rope sections, and the interval between firecrackers.

Materials Used

For making the simplest style of rope firecrackers the essential materials are cotton rope, cotton twine, and firecrackers. Sources of such materials should be located before need for them arises. Often it is advantageous to buy small quantities early for preliminary testing. The kinds and qualities of materials best suited for the purpose are discussed below.

Cotton rope serves both as a support and as a central fuse for the firecrackers. Firecracker fuses are inserted through the rope and are ignited as the rope burns slowly from one end toward the other. The interval between explosions is determined by the rate at which the rope burns and the spacing of firecrackers.

Care is necessary in selecting ropes of suitable thickness and tightness of twist. The most satisfactory ropes tested were 5/16 or 3/8 inch thick and consisted of 3 or 4 strands. The twist should be loose enough so that the strands are easily separable with the fingers and yet sufficiently tight to hold firecrackers until the fuses ignite.

Burning speed of rope is influenced by factors such as its diameter, tightness of twist, chemical treatments, and weather conditions. Saltpeter impregnation has been found to almost double burning speed.

Untreated cotton rope will usually withstand light drizzle or fog without interruption in its burning. In experimental tests a war-surplus rope, which had been treated for mildew resistance, was extinguished only by fairly heavy rainfall.

Firecrackers of the flash-salute type, known popularly as bulldogs, cannon crackers, cherry bombs, salutes, or whizbangs are well adapted for use in rope firecrackers. This type is relatively powerful, the sound equaling or exceeding that of a 12-gage shotgun blast. In general, they have stiff, waterproofed fuses which are well-cemented into the cartridge and easily inserted into a rope. The familiar small Chinese firecrackers are not practical for this use. Not only are they too weak to frighten birds effectively but also their limber fuses are difficult to insert between strands of rope and they absorb moisture readily.

A type of aerial bomb known as the 2-shot repeating bomb is manufactured especially for crop protection. It consists of two upright units mounted on a wooden block and connected by a fast fuse. This device is wax-coated for water repellency. These can be placed at intervals along a cotton fuse rope and the entire assembly operated from a specially designed rack (fig. 1). As a unit ignites, a small bomb is blown about 20 feet into the air where it explodes with a great intensity. This is followed in five or six seconds by an equally loud blast in the air from the second bomb.

Under certain conditions, such as frightening birds from some inaccessible places at a distance, the use of another type of explosive cartridge, the skyrocket, may be necessary. Because of fire hazard, possibilities of misdirection of a rocket's course, and expensiveness of rockets, it is advisable to operate them manually. They can be operated automatically, however, by braiding a short section of rope into the lead rope and fastening the other end of the short section to the fuse of the rocket.

Preparing Rope Firecrackers

It is common practice to prepare two sets of ropes for daily use, one that will burn from dawn till noon and the other to burn until sunset. Although it is possible to make up units that will continue to burn throughout the day, it is advisable to operate two assemblies daily. The afternoon and evening assembly should be adjusted where necessary to compensate for changes in atmospheric conditions that alter burning speed. This helps to regulate timing of explosions to meet field requirements.

On either side of the point at which the rope is to be cut, make tight ties with cotton twine about 3/4 of an inch apart. This prevents the rope from unwinding when cut. At suitable spacings, determined by local conditions, separate the strands and insert firecracker fuses. Spacing the firecrackers close together may cause them to drop off before the fuses ignite. Four feet of 5/16-inch cotton rope will usually burn from 6 to 8 hours. At that rate, explosions will be obtained at intervals of 7 1/2 to 10 minutes from firecrackers spaced one inch apart.

Setting up Ropes

Methods of setting up rope firecrackers vary according to the crop and field conditions. For maximum results they should be located within the field rather than along the margins.

With explosions occurring on the ground, the amount of ground cover will determine effective range. Field experiments with bulldog salutes in sweet

corn subject to heavy attack showed that adequate protection was obtained with the assemblies spaced at 400-foot intervals. In these tests an average of 56 salutes per day was used at each location. As yet no test performed has provided information on the maximum distance these salutes can be spaced to afford acceptable protection.

Since sound carries much farther if it occurs above the level of dense field crops, some farmers hoist the rope firecrackers by a pulley arrangement to the top of a 15- to 20-foot pole from which the firecrackers drop into a strong wire basket or wooden platform farther down the pole but still above the height of the crop.

Improvements have been made in design of such apparatus to eliminate various shortcomings. The most satisfactory model to date is illustrated in figure 2.

Two field tests have been performed to determine the effective range of repeating bombs. In a sweet-corn field in Florida under light blackbird attack no ears were damaged even as far as 1300 feet from the closest assembly. In two nearby fields having corn in approximately the same stage of maturity damage amounted to three percent in one case and two percent in the other. In the first check field, buzzing of birds by a low-flying airplane was practiced and in the second field both airplane and shotgun were used to frighten birds.

In a sweet corn field in Delaware, subject to heavy attack, 50 percent less damage resulted when the repeating bomb assemblies were spaced at 450-foot intervals as compared to 600-foot intervals. At 600 feet, 6 percent of the ears were damaged during the testing period.

In both instances the operations were performed during the 5-day period just before harvest, using approximately 40 repeating bombs per assembly per day.

Weatherproofing

Rope firecrackers can often withstand light drizzles without loss of effectiveness, except that they burn more slowly; but they need protection on rainy days and in heavy showers.

An inverted apple crate fastened to a pole provides good protection from both wind and rain. With this type canopy, the ropes can be fastened in loops, each loop dropping free as the rope burns to its attachment. The loop length can be adjusted so that the assembly does not hang far below the protecting box.

The stovepipe arrangement (fig. 2) for operating rope firecrackers with salutes and the rack for using repeating bombs already possess weatherproofing features.

Cautions, Comments, and Suggestions

Most States and municipalities regulate the sale, transportation, and use of firecrackers. Federal law prohibits their shipment into States where they are illegal. A prospective user must determine the legal status in his own locality.

Fire hazards must also be considered. In a blueberry patch with sawdust mulch, a fire was started fully 35 feet from a salute assembly. Usually the force of the explosion from salutes is so strong that no pieces of the cartridge are left smoldering, but occasionally the remains of a burning fuse are blown for quite some distance.

All species of birds do not respond to firecracker attack to the same degree, and within a given species response may vary depending upon a variety of factors. Birds that are breeding in the vicinity of a crop field, and juvenile birds that as yet have not acquired adult wariness, are most difficult to discourage. Under certain conditions flocks of heavily moulting adults that are accustomed to rest in brush or woodland adjacent to the field in which they feed may also present a problem.

After the breeding season, some birds, such as blackbirds, assemble in large flocks which return each evening to a favorite roosting spot. To protect field crops from these, it is very important to start rope-firecracker operations early each morning as the birds are beginning to arrive from the roost. It is usually an easy matter to drive them off some distance during this early morning flight period. Once they are allowed to settle down for any length of time, however, they are inclined to stay in that vicinity for the remainder of the day. For satisfactory results, explosions every 5 minutes are necessary during the first hour of bird activity.

It is also important to start control operations as soon as these birds begin to show interest in the crop before they become accustomed to coming regularly to the field to feed.

In large fields, especially those flooded for rice production, operation of rope firecrackers may be combined advantageously with the use of a .22 rifle. Sections of rope firecrackers can be placed along field margins, on ditch or canal banks, along roadways, near residences, or at other accessible places, while shooting from an elevated tower frightens birds from the more central areas.

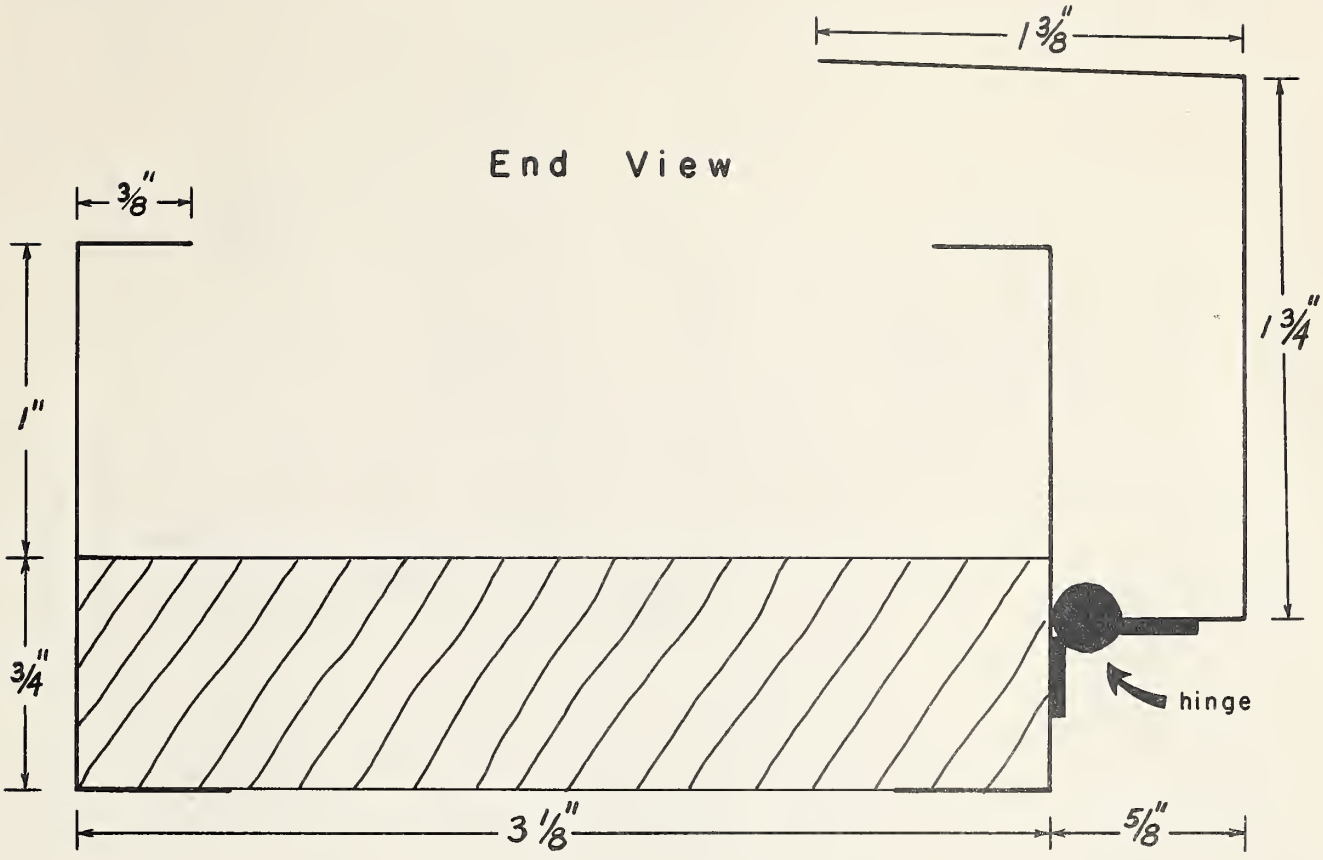
The long range of the .22 rifle gives it a distinct advantage over other scare devices. From a raised platform high above the crop level, the user of the .22 can tell where and when a shot should be directed against birds in the field. In situations where the .22 can be used safely, growers employ it against blackbirds that descend upon their fields in the early morning hours and then rely on rope firecrackers to repel birds throughout the day, when labor is required for other farm operations.

The cost of materials for protecting 1 acre 1 day by flash salutes and repeating bombs spaced at 400-foot and 900-foot intervals respectively, and with daily loads of 56 of the former and 40 of the latter amounts to about 20 cents for flash salutes and 35 cents for repeating bombs. In considering actual costs of the operations, however, it must be kept in mind that the labor cost of making up assemblies and erecting and lighting them in the field is almost five times as much for the flash salutes as for repeating bombs. Many more assemblies of the former are needed to obtain satisfactory protection. For larger acreages, therefore, the more expensive repeating bombs can be used more economically.

As stated previously, even among birds that tend to form flocks, there are sometimes individuals that fail to respond to the frightening device. To prevent these resistant birds from serving as decoys to other birds in the neighborhood, it is advantageous to rout them with a shotgun or, more economically, with a firecracker tossed near them.

Commercially prepared rope firecrackers are available, but they have not proved satisfactory, mainly because they lack adaptability to varied field conditions. The home-made rope firecracker can be adjusted as to timing of explosions to meet the need of any bird-damage situation.

The authors express their gratitude to Mr. Brooke Meanley and Mr. John T. Linehan of the U. S. Fish and Wildlife Service for assistance in developing and evaluating the rope firecracker technique in the field. Further thanks are due Mr. Linehan for the drawings and photographs used in this leaflet.



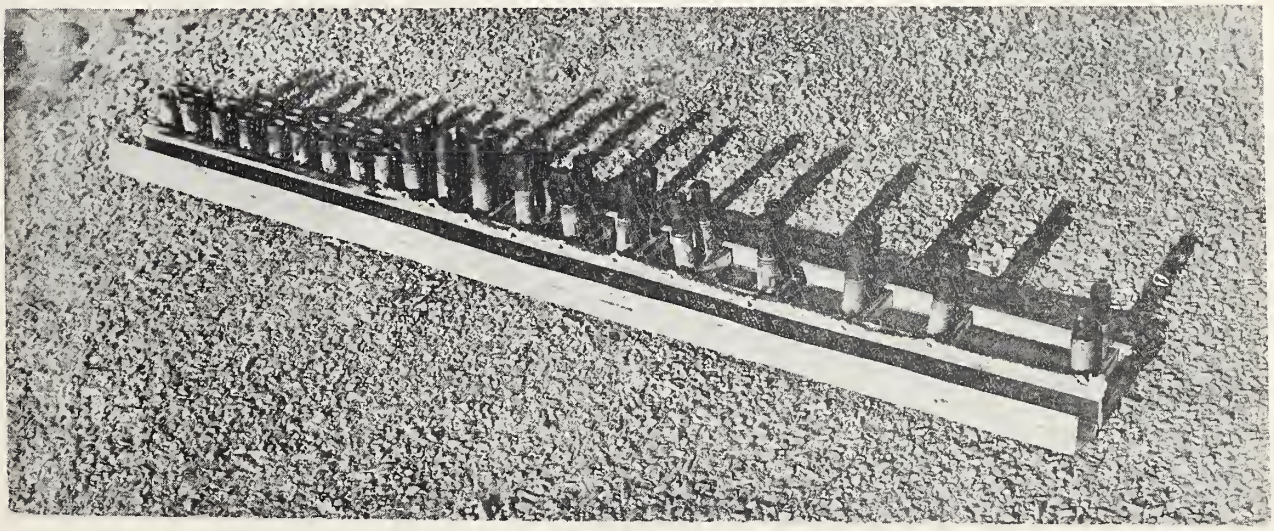


Figure 1.--Aerial bomb rack. Photo shows rack with protective cover open and with an assembly of 2-shot repeating bombs in operation. Bombs at left have exploded. Wood base is 4 feet long; sides and hinged cover made of galvanized sheet metal.

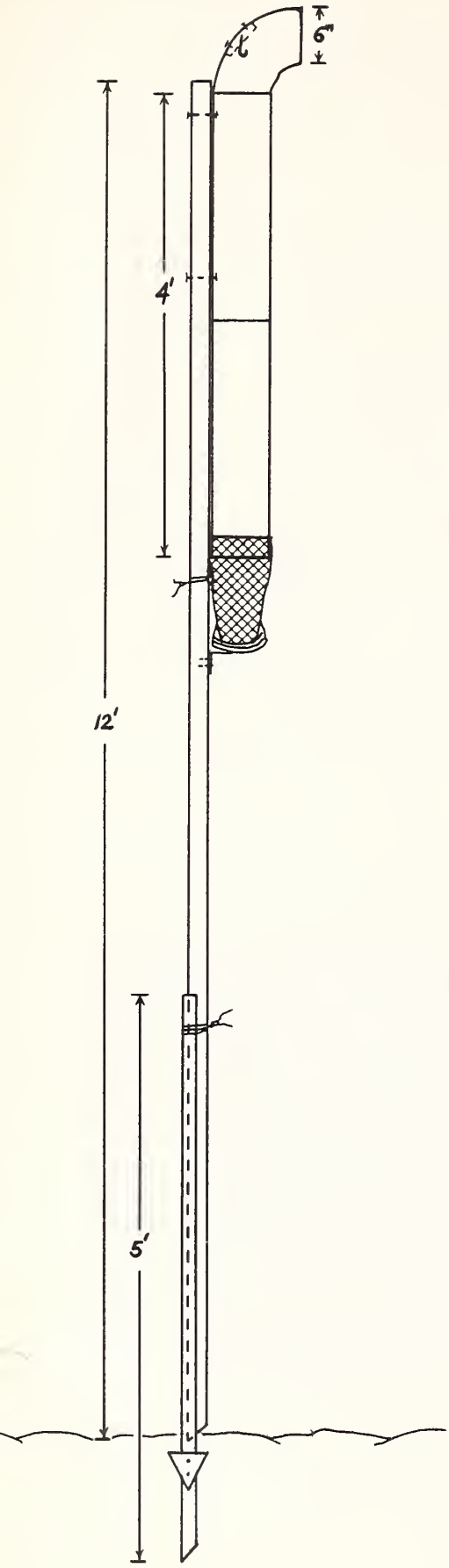


Figure 2.--Overhead rope-firecracker stand

Materials:

2 24" sections 6" diameter, galvanized stovepipe
1 6" diameter elbow
1 2" x 2" x 12' hardwood pole
1 5' right-angle steel fence post
1 15" x 12", $\frac{1}{2}$" mesh, light-gage hardware cloth
3 9" x 9", 1/3" mesh, heavy (14 or 16 gage) hardware cloth
2 3" x $\frac{1}{4}$" stove bolts with nuts and washers
1 4" corner plate
also: small hook, rounded block of wood, brads, nails, length of flexible wire

To load:

Unfasten wire holding pole to fence post and lower whole assembly. Light the rope firecracker and insert through elbow of stovepipe. Hang rope from hook. Stand assembly upright against post. Fasten with wire.

INT.-DUP. SEC., WASH., D.C. 77563